Developing Consistency in EM&V Approaches and Emissions Reduction Calculations for Energy Savings Performance Contracting Programs

Solution Summary

Goal: To initiate the development of standardized, replicable protocols which will include consistent approaches to measuring and verifying energy savings from energy savings performance contracts (ESPCs) and the compilation of savings data to understand program impacts and enable markets for savings benefits.

Barriers: Currently, the protocols for EM&V vary across and within states. This results both from varied reporting and tracking requirements by state agencies and different reporting formats adopted by energy service companies (ESCO) that carry out ESPC projects. As a consequence, ESPC savings results are difficult to aggregate, compare, and value in the market place.

Solution: Three states—Georgia, Kentucky, and Virginia—undertook a collaborative initiative to begin standardizing EM&V approaches and tools across their jurisdictions.

Outcome: Georgia, Kentucky, and Virginia researched and developed a set of recommended practices for improving the accuracy and consistency of measurement and verification practices for ESPCS through common approaches to energy savings data measurement, collection, compilation, and analysis. The states evaluated opportunities to standardize M&V practices, informed by participation in a promising new energy savings data tracking system developed and maintained by DOE's Lawrence Berkeley National Laboratory as well as the M&V Guidelines issued by the Federal Energy Management Program.

- *All three partner states have entered initial state agency project data in ePB.*
- *All three partner states have entered M&V data for several state agency projects.*
- *All the partner states agreed that ePB (or a comparable state-developed data collection system) could be useful for large or multiple project state and local government ESPCs.*
- *The states and non-state partners provided feedback to the ePB developers at Lawrence Berkeley National Laboratory to improve its functionality, clarity, and ease of use by states and localities.*

Background

The partner states were represented in this project by their respective energy offices—the Virginia Department of Mines, Minerals and Energy (DMME); Georgia Environmental Finance Authority (GEFA); and Kentucky Department of Energy Development and Independence (DEDI). These energy offices have different roles relative to ESPC policy, and all collaborate with other state offices and external stakeholders to establish ESPC policy. Each partner state is bound by specific practices and procedures articulated in statute and regulation, which vary from state to state. These policy differences make it difficult for the partner states to easily agree on solutions to overcoming EM&V consistency barriers.

Further, changes to ESPC policies require extensive time and effort and, potentially, new legislation, presenting another barrier to policy reform.

Energy Savings Performance Contracting (ESPC)

Energy Savings Performance Contracting (ESPC) is a budget-neutral approach to make building improvements that reduce energy and water use and increase operational efficiency. By partnering with an energy service company (ESCO),[i] a facility owner can use an ESPC to pay for today's facility upgrades with tomorrow's energy savings—without tapping into capital budgets. State and local governments can implement ESPC projects in their own facilities, as well as promote and support ESPC projects through ESPC programs.[ii] Various building market sectors have used ESPCs for decades. As distinguished from traditional design/build projects, ESCOs provide energy savings performance guarantees to building owners for ESPC projects. Further, ESPCs are typically structured so that project financial savings obviate the need for the building owner to tap into its own capital budget to fund the project.

Evaluation, Measurement, and Verification (EM&V) for ESPC

Evaluation, Measurement and Verification (EM&V) is the collection of methods and processes used to assess the performance of energy efficiency activities so that planned results can be achieved with greater certainty and future activities can be more effective.[iii] The development of consistent and robust EM&V for ESPCs is critical to ensuring the performance of efficiency projects and programs. Annual project level "verification" (or "V") of energy savings is performed to assess if ESPC energy savings guarantees have been satisfied. It is typically accomplished by some mutually agreed-upon method or protocol of savings measurement or monitoring (or "M"), which describes what parameters will be measured under what specific project conditions (equipment and building function and utilization) and how savings will be calculated. Evaluation (or "E") typically refers to a programmatic or state- or jurisdiction-wide assessment of a group of ESPCs, and is not applied to an individual project.

Policies

State EM&V for ESPCs

Currently, the protocols for EM&V vary across and within states. This results both from varied reporting and tracking requirements by state agencies and different reporting formats adopted by energy service companies (ESCO) that carry out ESPC projects. Cross-program and cross-state evaluations are uncommon and present a barrier to recognizing or crediting ESPC savings for wider state energy and environmental applications. There has been little or no direct interaction between any states regarding ESPC project requirements, including individual project data collection, savings estimation and verification, and the summation of aggregate project results. Therefore, ESPC savings data are not consistently and transparently defined, compiled, measured, and recorded by states. In addition, ESCOs present project cost and savings data in many different formats and units of energy. As a consequence, ESPC savings results are difficult to aggregate, compare, and value in the market place. Consistent and rigorous EM&V is needed to provide confidence to all stakeholders that the savings are real, meet ESCO guarantees at the project level, and that the broader state (or local) ESPC program is meeting its financial, energy, and other objectives.

Federal EM&V for ESPCs

The federal ESPC market imposes more standardized M&V requirements, since FEMP is able to set EM&V standards for ESPC projects performed on all federal facilities.[iv,v] FEMP requires use of its own M&V Guidelines, which are based on the IPMVP but guide ESCOs to use certain approved methods within each option. Federal Energy Management Program (FEMP) M&V Guidelines contain procedures and guidelines for quantifying the savings resulting from energy efficient equipment, water conservation, improved operation and maintenance, renewable energy, and cogeneration projects installed under performance-based contracts.[vi] FEMP encourages ESCOs to enter project data in ePB and requires it for participants in the U.S. DOE ESPC ENABLE program.[vii] Also, FEMP is migrating legacy federal ESPC data into ePB.

Process

Early on, the team recognized that it needed a better understanding of the roles, responsibilities, constraints, and perspectives of the major ESPC participant groups in each partner state: the state's ESPC oversight agencies; the ESPC customer state agencies local entities; and the ESCOs.

To gain this insight and develop more consistent definition, measurement, and documentation of ESPC savings data, both within and among their states, the team circulated two rounds of questionnaires. The initial questionnaire met with varying degrees of success. From state-to-state, targeted participant groups responded at widely varying rates, to the point where the team agreed that a statistically valid sample was not attained. The questionnaire was then reissued to each state's self-selected ESPC experts, state energy office individuals with the greatest experience and knowledge of ESPC processes and projects in the state. While not providing statistical rigor, the experts' responses provided good profiles and perspectives of each states' ESPC program and practices.

The team then broadened the survey to several other states (Alabama, Colorado, Hawaii, and Massachusetts) and FEMP to gather additional examples of state (and federal) ESPC practices to better understand commonalities and divergences. The results confirmed the observation that states diverge significantly in ESPC authority and practices, including M&V, reporting and tracking requirements.[viii] Simultaneously the team developed a set of eight high-level recommended M&V practices for ESCOs and their client agencies. The recommendations were presented to the National Association of Energy Services Companies (NAESCO) Board of Directors, who will convene a workgroup focused on M&V practices.[ix]

The team also engaged in a pilot program to evaluate LBNL/DOE's eProjectBuilder (ePB) as a tool to collect and analyze the results of ESPCs on state and municipal facilities in each of the MEASURES states. The partner states were hopeful that ePB's evolving M&V capability might make it an ideal repository for verifiable energy savings. ePB permits ESCOs and their customers to upload and track ESPC project information, generate basic project reports, benchmark new ESPC projects against historical project data in a growing national database, and integrate with complementary tools such as energy efficiency registries. Following the pilot, the team made a series of suggestions to LBNL to improve ePB utility and ease of use by states (and localities).

Outreach

The project reached out to agency and ESCO stakeholders in the three partner states through surveys, later expanded to include several other state energy offices and FEMP. Partner states engaged agencies, ESCOs, and sometimes the local chapter of the Energy Services Coalition. Interim status and results were presented at several venues, including the 2015 Energy Services Coalition meeting, the 2016 Better Buildings Summit, and a webinar of the Southeast Energy Efficiency Alliance (SEEA, a project partner). NAESCO has cited MEASURES to its Board of Directors and presented the project's draft M&V principles, helping prompt NAESCO to begin developing an M&V workgroup. Also, the project description and materials have been posted by DMME, SEEA, and Clean Energy Solutions, Inc.[x]

Measuring Success

Through this project, the states collaboratively identified recommendations for the development of more robust and consistent EM&V for ESPCs. As a first step, the states conducted surveys to map the roles, responsibilities, constraints, and perspectives of the major ESPC participant groups in each partner state (e.g., the state's ESPC oversight agencies; the ESPC customer state agencies and local entities; and the ESCOs) and conducted outreach to gain perspectives from these stakeholders on potential EM&V improvements. The states also evaluated federal EM&V guidelines developed by FEMP. Finally, the states piloted the eProject Builder (ePB)[xi] as a tool for compiling energy savings data.

The success of this project is reflected in the findings and observations collected from stakeholders among all three Partner States and the recommendations that have been suggested by the project team concerning ePB and EM&V improvements for ESPCs.

Outcomes

Prior to this project, there had been little dialogue between the partner states regarding the process, implementation, and tracking of ESPC efforts or results. The project resulted in the periodic issuance of partner states' reports analyzing the challenges, progress toward challenge resolution, and points of consensus. [xii]

M&V Practices

The partner states acknowledge the need for more adequate EM&V education and training on an on-going basis and agree that strengthened outreach, education, and technical assistance on ESPCs including EM&V aspects could enhance the number and quality of ESPC projects and improve quantification of financial, energy, water, and environmental benefits. MEASURES states are considering additional education and training of state and local agency staff regarding M&V best practices. The project team recommends a strong focus on outreach, training, and education for states newer to EPSC.

For Virginia, the project occurred at an opportune time to benefit from lessons learned, to apply that knowledge and to make significant improvements in the Commonwealth's mature ESPC program for public bodies. For Georgia, it was beneficial to participate in the MEASURES project because its ESPC program is new and the MEASURES process allowed for detailed review and comparison of best practices among states. It helped validate many program rules, such as requiring M&V for the life of the contract. For Kentucky, as ESPC is a distributed affair, with different sectors being overseen by different state entities, the project helped to clarify those differences and pinpoint exactly where critical ESPC

M&V oversight potential exists. The team discovered inherent differences in each partner state's ability and intent to adopt all of the identified Recommended Best Practices.

The partner states identified the following ESPC M&V Recommended Practices, but acknowledge that some of them are not always immediately achievable due to individual state barriers previously discussed:

1. Develop a method for measuring and verifying avoided consumption which is agreed upon between the ESCO and Customer at the start.
2. Consider using near-real-time monitoring and encourage the use of EM&V 2.0 / advanced M&V tools and practices as costs and use of these methods are becoming increasingly acceptable and accessible.
3. ESCOs will encourage the involvement of a technical consultant to represent customer interests in reviewing M&V process.
4. Identify the savings and units of measurement in the project contract at the start of the project.
5. The real benefits and savings will be documented in regular M&V reports.
6. Customer agencies should assure that reports are reviewed to ensure ESPC conditions and guaranteed savings are being met.
7. ESCOs will cooperate by pro-actively ensuring access to transparent tracking documentation, using ePB, and contributing to each state's ESPC tracking system.
8. Consider a means of soliciting and documenting customer satisfaction in each contract.

Data Compilation

For data gathering and reporting the partner states agreed that ePB is a beneficial and accessible standard online tool for gathering, organizing, and recording information on ESPCs as they are implemented. However, the states noted that ePB may be most practical for utilization by larger entities that manage multiple projects and that some states may have already developed data tracking mechanisms that they feel meet their needs.

Use of ePB can provide structure to help overcome data management barriers of inconsistent definition of project terms (ECM names and categories, units of energy savings), nonstandard project metrics collection and formatting (spreadsheet formatting and designated cell inputs), and inconsistent measurement (disclosure of savings estimation and M&V methods and annual results). It can be a consistent guide for all states on types of data to collect and report and ways to consistently format and present such information. It could provide discipline to instruct ESCOs to input key project metrics in a consistent manner across all projects in all states. Thus, it can ease comparisons or aggregation of results across projects and programs.

An M&V module was recently added to ePB, allowing it to be used to document M&V protocols, methods, data, and calculations used and performed. ePB could, thus, help states better assure that reported monetary and energy savings (and associated emissions avoidance) are credible and creditable, whether for reporting ESPC performance to policymakers and the public or for pursuing credit under energy efficiency resource standards, grid operator capacity markets, or for air quality regulatory purposes.

The team's recommendations to and interaction with LBNL resulted in LBNL's increased understanding of the partner state's ability and need to require ESCOs to gather and input ESPC project data, M&V data in particular. It allowed the partner states to understand LBNL's desire to accommodate the data collection needs of federal, state and local agencies and ESCOs. It is hoped that continued interaction with LBNL will advance the MEASURES goal to "develop a consistent, widely replicable process for gathering ESPC results, measuring and verifying their savings with stakeholders, and entering the data in a respected database," even if that database turns out to be something other than ePB for some states.

The partner states will continue to work with the ESCO industry and ESPC contracting entities to take advantage of ePB capabilities as is cost-effective, and to provide feedback to LBNL on the tool's functionality to enhance its utility and value to states. Other states may wish to consider ePB as a helpful data-tracking tool, particularly for large-scale projects, and consider incentives or requirements for the use of ePB within their ESPC program frameworks.

[i] Energy Service Companies (ESCOs) Energy service companies (ESCOs) develop, design, build, and fund projects that save energy, reduce energy costs, and decrease operations and maintenance costs at their customers' facilities. In general, ESCOs act as project developers for a comprehensive range of energy conservation measures and assume the technical and performance risks associated with a project. ESCOs are distinguished from other firms that offer energy-efficiency improvements in that they use the performance-based contracting methodology. When an ESCO implements a project, the company's compensation is directly linked to the actual energy cost savings. https://energy.gov/eere/femp/energy-service-companies-0

[ii] https://energy.gov/eere/slsc/energy-savings-performance-contracting

[iii] https://energy.gov/sites/prod/files/2014/05/f16/what_is_emv.pdf

[iv] U.S. DOE, Federal Energy Management Program, *op. cit.*

[v] Of the states surveyed by the MEASURES team, only Massachusetts uses the FEMP guidelines for state agency ESPC projects.

[vi] FEMP M&V Guidelines Version 4.0. https://energy.gov/sites/prod/files/2016/01/f28/mv_guide_4_0.pdf

[vii] Energy Savings Performance Contract ENABLE for Federal Projects http://energy.gov/eere/femp/energy-savings-performance-contract-enable-federal-projects

[viii] MEASURES Project, 2016, "Recommended ESPC M&V Principles Development" at http://seealliance.org/initiatives/state-local-utility-policy/emv-approaches-performance-contracting/.

[ix] NAESCO is a partner organization in the MEASURES project.

[x] These presentations and other project papers are available at: http://seealliance.org/initiatives/state-local-utility-policy/emv-approaches-performance-contracting/

[xi] eProject Builder (ePB) is a secure web-based data entry and tracking system for energy savings performance contract (ESPC) projects. ePB is a free service developed and managed on behalf of the Department of Energy's Federal Energy Management Program (FEMP) by the University of California/Lawrence Berkeley National Laboratory (LBNL). ePB enables energy service companies (ESCOs) and their customers to securely: upload, track and access ESPC project-level information for the life of the performance contract; quickly generate data for project and portfolio reports; develop project scenarios using standardized amortization calculations; benchmark new ESPC projects against historical project data.
https://eprojectbuilder.lbl.gov/home/#/about

[xii] The project produced several relevant white papers, including "Evaluation, Measurement and Verification Protocols"; "Recommended ESPC M&V Principles Development" and "Final ePB Comments Memo from All MEASURES States". These and other project papers are available at: http://seealliance.org/initiatives/state-local-utility-policy/emv-approaches-performance-contracting/